The University of Texas at Tyler
Department of Electrical and Computer Engineering

CMPE 4309.001 : Digital Electronics

Syllabus

Catalog Description:

Two-stage OpAmps, Filters, Oscillators, CMOS – Manufacturing, circuit, and design perspectives; Logic gates and families; Arithmetic circuits; Programmable logic devices; Transistor-level flip-flop devices; Characterization and Synthesis of digital ICs; Interconnects; Timing Issues in Digital Circuits; Designing Arithmetic Building Blocks. Three hours of lecture each week. Three hours of lecture per week.

Prerequisites: EENG 3302 and EENG 3306

Credits: 3 (3 hours lecture, 0 hours laboratory per week)

Text(s): *Microelectronic circuits, 7th Edition*, by Sedra and Smith (Oxford University Press, ISBN 9780199339136, 2014).

Additional Material : Handouts and materials from other textbooks will be provided by the Instructor for specific topics.

Course Coordinator: Dr. Prabha Sundaravadivel, Associate Professor

Topics Covered: (paragraph of topics separated by semicolons)

Filter Transfer functions; Two-stage OP-AMPs; RC Oscillators; CAD tools; Arithmetic building blocks; CMOS Static Behavior; Memory Circuitry; IC Testing and Manufacturing; Energy-Delay Modeling.

Evaluation Methods: (only items in dark print apply):

1. Examinations/ Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes[1]: By the end of this course ,students will be able to:

1. Analyze the design techniques of two-stage OpAmps [1]
2. Compute the filter transfer function and approximation for Butterworth and Chebyshev filters. [1,2].
3. Analyze the principles of sinusoidal and OpAmp RC Oscillators. [2].
4. Use CAD tools in the design, simulation, and implementation of transistor-level design of logic gates. [2,3]
5. Analyze the voltage transfer characteristics of CMOS inverter. [1]
6. Design and implement Arithmetic building blocks using transistors. [1]
7. Compute power dissipation and delay through transistor sizing.[2]
8. Analyze the implications of Technology Scaling involved in digital IC design.[2]
9. Design special-purpose circuits at the transistor level.[1]
10. Design and analyze memory cells at the transistor level. [1,2]

[1]*Numbers in brackets refer to method(s) used to evaluate the course learning outcome.*

Relationship to Student Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Student Outcomes, which state that our students will possess:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics [1,2].
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [4,5].
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. [3]
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives [8]
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [7,9,10].
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. [6].

[2]*Numbers in brackets refer to course learning outcome(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		Hours
Engineering Sciences and Design:	3	Hours
General Education Component:		Hours

Grade Replacement:

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grade point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

Prepared By:	Prabha Sundaravadivel, Assistant Professor	Date:	11 January 2024
Edited By:	Prabha Sundaravadivel, Associate Professor		6 January 2025

The University of Texas at Tyler
Department of Electrical and Computer Engineering

Course: CMPE 4309.001, .040: Digital Electronics

COURSE OUTLINE

Course Coordinator:

Dr. Prabha Sundaravadivel
Associate Professor,
Department of Electrical and Computer Engineering
Office: RBN 2015
Email: PSundaravadivel@uttyler.edu
Office Hours: Tuesday / Thursday 11 AM-12:30 PM ,
Email, Canvas Discussion Boards,
Zoom ID: 93218434227
Passcode: Spring2026

Class Location/Time: Synchronous/in-person Class. The class meeting time is Tuesday / Thursday, 9:30 AM – 10:50 AM. You can login to the class using the following zoom ID

Join Zoom Meeting https://uttyler.zoom.us/j/88140367563?pwd=HStaDbmzLyXl4A1y8sehYI9JXkGYEY.1

Meeting ID: 881 4036 7563
Passcode: Spring2026

Grading Policy:

Attendance	5%	
Quizzes	20%	Total – 4
Homework	20%	Total – 4
Mid-Term	25%	
Final Exam	30%	
Total	**100%**	

Semester Schedule (Tentative):

Week	Start Date	Topics Covered	Exam Schedule	Mini Project
1	13- Jan	*Two-stage OPAmps – Chapter 13.1 and 13.2*		
2	20- Jan	*Filter Transfer functions – Chapter 17.1 and 17.2*		Homework – 1
3	27– Jan	*Filters – Butterworth and Chebyshev – Chapter 17.3*	Quiz – 1	
4	3- Feb	*Sinusoidal Oscillators – Chapter 18.1*		
5	10 – Feb	*OpAMP RC Oscillators - Chapter 18.2*		Homework – 2
6	17 – Feb	*MOSFET Transistor – Chapter 5.1*	**Mid- Term Exam**	

7	24- Feb	*CMOS Inverter – Static Behavior – Chapter 14.2*		
8	3 – Mar	*CAD Tools and SPICE modeling*	Quiz- 2	
9	9- Mar	***SPRING BREAK***		
10	17 - Mar	*Static Latches and Registers – Chapter 16.1 , Chapter 15.2*		Homework -3
11	24- Mar	*Power, Energy and Energy-Delay modeling*	Quiz – 3	
12	31 - Mar	*Memory Circuitry – Chapter 16.2, 16.3*		*Homework – 4*
13	7 – April	*Layouts in IC Design*	Quiz – 4	
14	14 - April	*Testing and Verification of manufactured circuits*		
15	21 - April	*Arithmetic Building Blocks – case studies*		
16	28 - April		**Final exam**	

Mode of Delivery:

This course is a synchronous in-person course. *The first 3 weeks of the semester will be offered as online classes / recorded lectures due to work-related travel. The announcements will be made in advance in Canvas regarding the same.* Attendance is mandatory for all in-person sessions. It's the student's responsibility to review the given materials promptly and stay updated on weekly course content. Feel free to email the instructor with concerns or feedback about the lectures.

Flexible Online Office Hours:

Students can meet with the instructor during office hours on Tuesdays /Thursdays (11:00 - 12:30) at her office in RBN 2015 or via the class Zoom link. However, if students are unavailable during the mentioned office hours, they are strongly encouraged to schedule a meeting with the Instructor anytime.

Quiz:

There will be a total of 4 quizzes in the class that cover the theoretical concepts. The quizzes will be blended as part of the course module for each week. This is to keep the students on track with the course content. Quizzes will be conducted through Canvas.

Homework:

Homework assignments will include problems from the textbook, and students will have at least one week to complete each assignment. The course will include a total of four homework assignments, collectively worth 20% of the final grade. Any instance of plagiarism will result in a zero for all homework assignments.

Exams:

There will be two exams in this course. Students are expected to be logged in zoom while taking the exam. The exam review will be conducted at least one week before the exams. The tentative schedule for the exams is as follows:

Mid Term Exam on 19 February 2026.

Final Exam on 28 April 2026.

Academic Integrity:

Students should be aware that absolute academic integrity is expected of every student in all undertakings at the University of Texas at Tyler. A plagiarism check will be done all the reports submitted by students. Copied or unoriginal solutions will result in a "0" in that course component. **The use of Generative AI is not allowed for completing the reports in this course. Evidence of a pattern in academic dishonesty will lead to substantial university-imposed penalties.**

Attendance Policy and Class Participation:

Students are expected to review all the posted lectures and materials every week. By signing up for the class, it is understood that the student has checked for ANY significant recurring conflicts that might affect the completion of the course requirements. Attendance will be monitored through timely completion of the submissions and quizzes. The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. Class participation is graded based on attendance and the involvement of students in the class activities.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php

Grade Replacement/Forgiveness and Census Date Policies:

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the semester's Census Date in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Please file a Grade Replacement Contract to avoid both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability Services

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement:

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation:

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor during class's first week. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Happy Learning!